SD
11
.A1
A42
no.254
1984

85 2648

Forest
Service

United States
Department of
Agriculture

FS–254

Ponderosa Pine

An American Wood

Ponderosa pine is one of the most widespread and important softwood lumber species in western North America. The wood is relatively light in weight, averaging about 28 pounds per cubic foot. The nondurable, nearly white wood has a straight grain and medium coarse texture. It is easy to work with hand tools, glues well, and is average in paint- and fastener-holding abilities. It is the principal millwork species being used for window framing, sashes, doors, molding, shelving, and paneling.

F–388600

Ponderosa Pine
(*Pinus ponderosa* Dougl. ex Laws.)

David P. Lowery[1]

Distribution

Ponderosa pine is the most widely distributed pine in North America, extending from British Columbia into Mexico and from the Pacific coast to Nebraska. The species grows from latitude 24° N. to 51° N. and from longitude 99°30′ W. to 124° W. Commercial stands occur in all the Western States, British Columbia, and Mexico (fig. 1). The species is an integral component of 5 forest cover types, of which 4 are climax, and is present in 20 other forest types. In some areas, it occurs in extensive pure stands.

As its wide distribution suggests, ponderosa pine grows on a variety of different soils. It probably grows best on well-drained and deep sandy, gravelly, and clay loams between elevations of 4,000 and 8,000 feet. The elevational range is from sea level to about 9,000 feet. Benches and plateaus with westerly or southerly aspects are preferred sites.

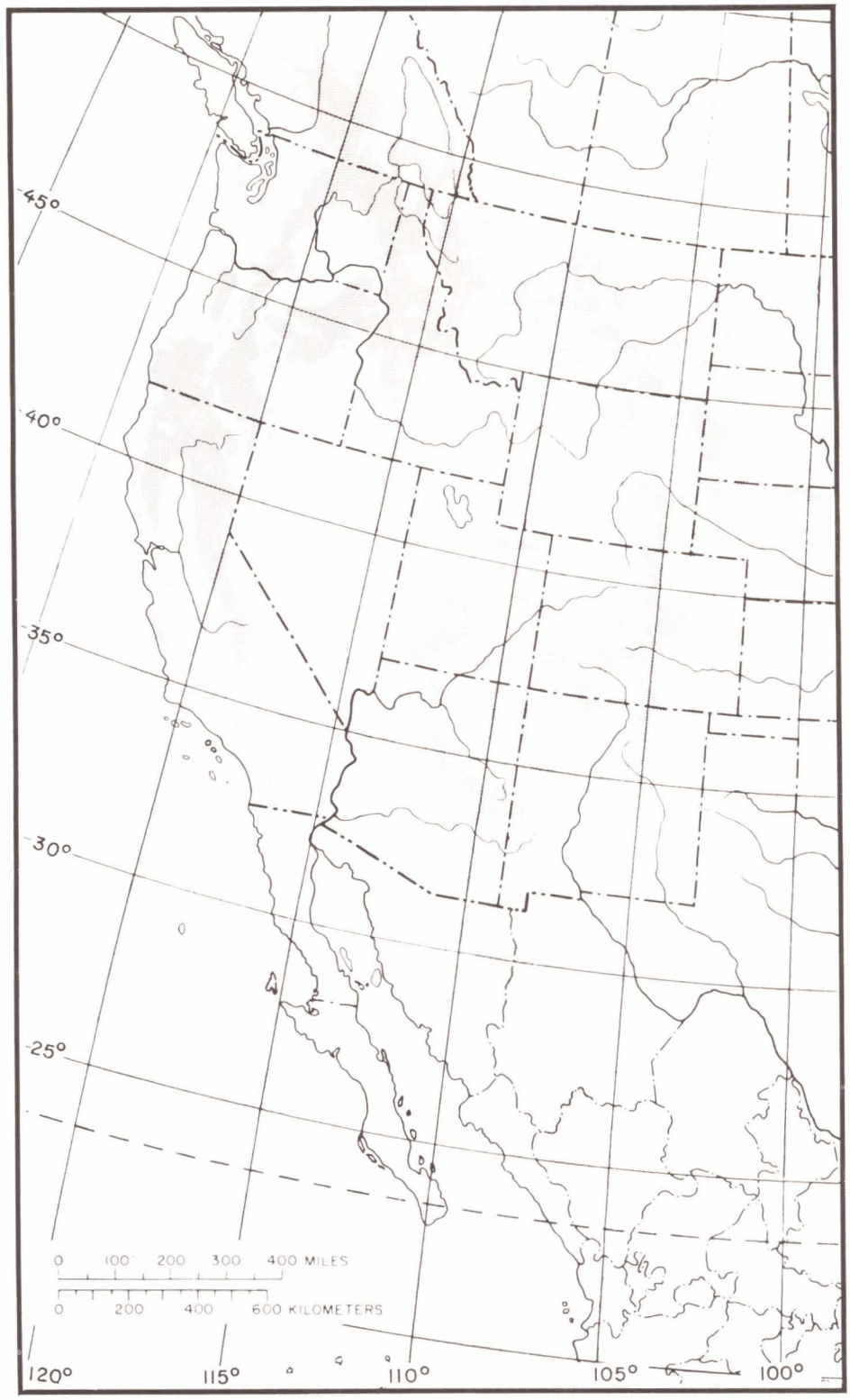

Figure 1—Natural range of ponderosa pine. F-52156

[1]Wood Technologist, U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station, Forestry Sciences Laboratory, Missoula, Mont.

Description and Growth

Ponderosa pine has a pyramidal crown when young, but the crown becomes flat at maturity. Older trees often attain ages of 300 to 600 years, diameters of 30 to 50 inches, and heights of 150 to 180 feet.

The needles of ponderosa pine are commonly in clusters of two or three, gray green to dark yellow green in color, and 3 to 11 inches long. The cones, which grow either singly or in clusters, are from 3 to 6 inches long, egg-shaped or cylindrical; their scales often have a spine (fig. 2). The seeds are about one-fourth of an inch long and have light tan wings.

On young trees, the bark is brown to black and deeply furrowed, becoming yellowish brown to cinnamon color and scaly, and is plated with irregular fissures on older, slow-growing trees. The characteristic yellow bark was the origin of its once popular name, yellow pine.

Ponderosa pine produces seed at irregular intervals that are influenced by area, age class, and tree size. In California, medium seed crops occur every 2 years and heavy cone crops every 8 years on the average. In Montana, the species has been classed as a poor seeder west of the Continental Divide and a fair seeder east of it. Because of the irregularity of seed production, naturally reproduced stands are frequently either understocked or overstocked. On the best sites and with proper stocking, growth rates of over 1,000 board feet per acre per year have been recorded. However, on average sites, young trees usually increase about one-half cubic foot per year.

Ponderosa pine is more shade tolerant than western larch (*Larix occidentalis*), but less so than Douglas-fir (*Pseudotsuga menziesii*), sugar pine (*Pinus lambertiana*), firs (*Abies* spp.), western white pine (*Pinus monticola*), and incense-cedar (*Libocedrus decurrens*). When competing vegetation is removed, the species responds with increased growth, regardless of age.

Figure 2—Branch of ponderosa pine with needles and cone. F-490470

Common Names

Ponderosa pine is the common name generally used, but the species was once known by a variety of names including western yellow pine, western soft pine, yellow pine, ponderosa pine, rock pine, bull pine, and blackjack pine. The last two common names are used extensively to describe young second-growth timber.

Related Commercial Species

Ponderosa pine is usually sold by itself because of its high marketability, although Jeffrey pine (*Pinus jeffreyi*) is included without distinction. In some instances, the lower lumber grades of sugar pine and western white pine are marketed as ponderosa pine. Occasionally, small amounts of lodgepole pine (*Pinus contorta*) are included with ponderosa pine lumber.

Supply

The total stand of ponderosa pine sawtimber (combined with intermingled Jeffrey pine) in the United States in 1977 was estimated to be 192 billion board feet on approximately 26.5 million acres. The net volume of growing stock, which includes smaller trees, was estimated to be 38 billion cubic feet. These volumes grow chiefly on an estimated 27 million acres of commercial forest land classified as the ponderosa pine type. Nearly half of the commercial acreage and nearly two-thirds of the sawtimber volume occurs in Oregon, Washington, and California. The remaining sawtimber occurs in Arizona, New Mexico, Colorado, Wyoming, South Dakota, Montana, Idaho, Utah, and Nevada.

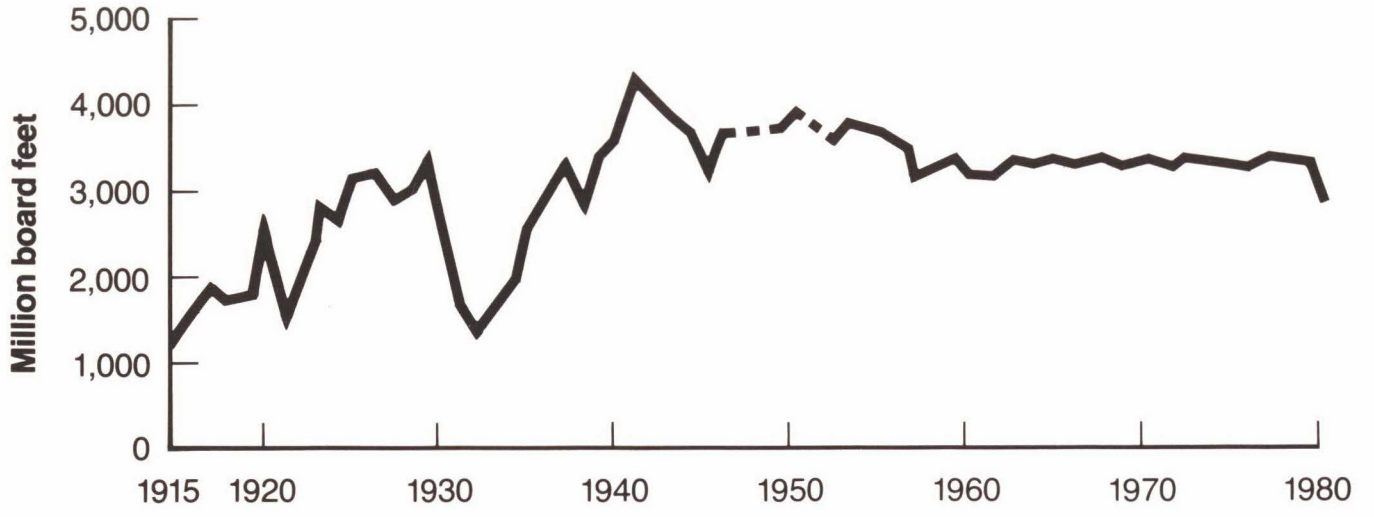

Figure 3—Ponderosa pine lumber production, 1915–80.

Production

The production of ponderosa pine lumber has exceeded 3 billion board feet annually since 1939. Production reached an all-time high in 1941 when an estimated 4.25 billion board feet was produced (fig. 3). Lumber production in 1980, a depressed market year, was estimated at 3.1 billion board feet.

Ponderosa pine is also manufactured into knotty pine plywood paneling. In addition, many pine sawmills remanufacture lowgrade lumber that has relatively poor marketing opportunities into cut stock. These small clear pieces of wood are used for toys, furniture, millwork, and other specialty products.

Ponderosa pine is also an important pole species. From 1969 to 1979, approximately 51,000 poles were treated with a preservative annually by either pressure or nonpressure methods.

Production figures are not available, but a substantial volume of ponderosa pine is harvested for fenceposts. Fenceposts are generally cut from overstocked second-growth stands in conjunction with silvicultural thinnings. Fencepost production is greatest in Arizona, New Mexico, and South Dakota, where abundant pure stands of ponderosa pine occur and where other species suitable for fenceposts are not plentiful.

Although fire is a considerable threat to dense stands of ponderosa pine saplings or small pole-sized timber, the mature trees are quite fire resistant. At least 108 species of insects attack ponderosa pine in the coastal areas and 59 insect species attack it in the Rocky Mountain regions. Bark beetles of the genus *Dendroctonus* are the most important tree killers. *Heterobasidion annosum* is a root disease that kills ponderosa pine trees of all ages. *Dichomitus squalens* and *Phellinus pini* are the most important heartrot pathogens in the species, and the most widespread disease is dwarf mistletoe, *Arceuthobium* spp.

Characteristics and Properties

The heartwood of ponderosa pine is yellowish to light reddish or orange brown and the sapwood is nearly white to pale yellow. In young trees, the sapwood may make up more than half the volume and, in older trees, it may be 2 inches or more in width. The freshly cut wood has a distinctly resinous odor, but not a characteristic taste. The grain is generally straight but frequently shows "dimpling" on the tangential surface. Ponderosa pine wood is comparatively light in weight, soft, moderately weak in bending and endwise compression, and moderately low in shock resistance. It has an average specific gravity of 0.38, based on green volume and ovendry weight, and a density of 28 pounds per cubic feet at 12 percent moisture content. It resists splitting when nailed but is only average in nail-holding ability.

Ponderosa pine dries easily—either in dry kilns or by air seasoning when proper methods are used—and is moderately low in shrinkage. When properly manufactured and installed, ponderosa pine stays in place well. Under conditions favorable to decay, it is not durable unless properly treated with preservatives. Ponderosa pine is espe-

cially well suited for all kinds of millwork—window frames, doors, shelving, molding, and paneling. It is also well suited for furniture if hardness or high strength are not required. It is perfectly satisfactory for light framing members like studs and trusses in applications where loads are minimal.

Principal Uses

Ponderosa pine has been in relatively high demand since the early days of the West. The Lewis and Clark Expedition of 1804–06 made dugout canoes of ponderosa pine logs for the trip down the Clearwater River of Idaho. As early as 1915, more than 1.2 billion board feet of ponderosa pine lumber was manufactured yearly, and by 1920 production was nearing 3 billion board feet. To the early western settler, ponderosa pine was plentiful, readily available, and easy to manufacture. This species was one of the first shipped to the eastern lumber market. Today it is frequently used as a standard in comparison with other softwoods.

Principal uses of the lumber include paneling, molding, shelving, trim, sheathing, and framing. Ponderosa pine is the major species used in the construction of windows and panel doors. Significant volumes are used for boxes, crates, and furniture. Smaller amounts are used in conjunction with metal for furniture, mattresses, and bedsprings. Other manufactured applications include pattern stock in the metals industries, wooden toys, caskets, footwear, and luggage. In roundwood form it is used for posts, poles, and house logs; standing dead trees are preferred for the last use. Mill residues, slabs, edgings, and trim are a source for chips used in pulp and paper manufacture. Planer shavings are used by the particle board industry. Planer shavings and sawdust are manufactured into particle board for use by the construction, furniture, and other industries. Ponderosa pine plywood is suitable for sheathing subflooring, underlayment, siding, and many other uses.

Ponderosa pine serves esthetic uses—substantial numbers of younger trees are used each year for Christmas trees, and boughs and cones are used to make novelty art items. The open-grown, parklike stands of mature and overmature ponderosa pine have always been a part of the western landscape and have played an important role in outdoor recreation. Big game and domestic livestock make considerable use of the ponderosa pine forest type.

References

American Wood Preservers' Association. Proceedings of annual meetings. McLean, VA: American Wood Preservers' Association; 1963–1980.

Fowells, H. A., comp. Silvics of forest trees of the United States. Agric. Handb. 271. Washington, DC: U.S. Department of Agriculture; 1965. 762 p.

Furniss, R. L.; Carolin, V. M. Western forest insects. Misc. Publ. 1339. Washington, DC: U.S. Department of Agriculture; 1977. 645 p.

Harlow, W. M.; Harrar, E. S.; White, F. M. Textbook of dendrology. 6th ed. New York: McGraw-Hill; 1979. 510 p.

Hepting, G. H. Diseases of forest and shade trees of the United States. Agric. Handb. 386. Washington, DC: U.S. Department of Agriculture; 1971. 658 p.

Panshin, A. J.; de Zeeuw, C. Textbook of wood technology. 4th ed. New York: McGraw-Hill; 1980.

U.S. Department of Agriculture, Forest Service. An analysis of the timber situation in the United States 1952–2030. For. Resour. Rep. 23. Washington, DC: U.S. Department of Agriculture; 1982. 528 p.

U.S. Department of Agriculture, Forest Service, Forest Products Laboratory. Wood handbook: wood as an engineering material. Agric. Handb. 72. Rev. ed. Washington, DC: U.S. Department of Agriculture; 1974. 428 p.

Revised October 1984.